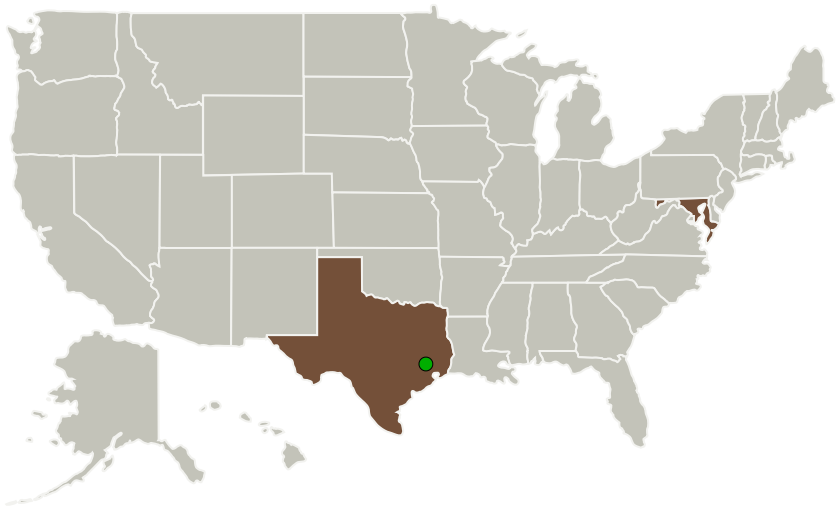
Damage Tolerant Composite Systems for Spacesuits, Phase I

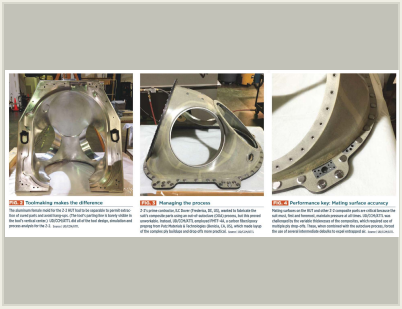
Completed Technology Project (2017 - 2017)

Project Introduction

The project goal is to increase impact resistance compared to the baseline laminate used in Z-2 test article from 100 J to 300 J. After impact, the laminate has to have an operational loads. It is also desirable to make improvements in the efficiency and quality of the manufacture of suit components. Two high-level approaches are being proposed to inhibit post-impact air leakage: (1) make the laminate more impact resistant, and (2) prevent cracks from traversing thickness of laminate. The first approach, making the laminate more impact resistant, also aims to improve post-impact mechanical properties of the laminate. Maher & Associates LLC proposes to design and develop three new concepts for improving the damage tolerance of the current composite structure concept of the Z-2 spacesuit. In developing these concepts, Maher & Associates LLC will partner with University of Delaware. Our personnel with work with university personnel at their Applications and Technology Transfer Laboratory (ATTL) to fabricate coupons and conduct testing. In addition to characterizing the structural and impact resistance of the concepts, panels will be fabricated that include Z-2 design features to assess the manufacturability of the concept. In reviewing the literature, we noticed that there are subtle differences in the clamping approach in the impact testing that was done as art of the original Z-2 development work and the ASTM D-7136 test called out in the topic. In order to assure that a proper baseline is established, we will also fabricate and test fabricate acceptable leak rate and retain sufficient mechanical properties to sustain a test article representative of the original design.

Primary U.S. Work Locations and Key Partners





Damage Tolerant Composite Systems for Spacesuits, Phase I Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
Maher & Associates, LLC	Lead Organization	Industry Small Disadvantaged Business (SDB)	Baltimore, Maryland
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Maryland	Texas

Images

Briefing Chart Image
Damage Tolerant Composite Systems for Spacesuits, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/134883)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Maher & Associates, LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

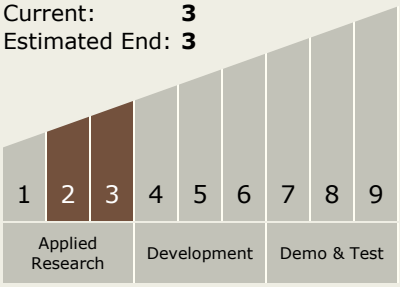
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Michael Maher

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.1 Pressure Garment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System